. ELECTRICAL ENGINEERING

Electrical engineering is an engineering discipline that deals with the study and application of electricity and electromagnetism. Its practitioners are called electrical engineers. In the subfield of electronics, electrical engineers construct models of electrical components (such as resistors, capacitors, inductors, transistors, diodes, semiconductors) for simulation purposes. They combine these components into larger electrical networks. The subfield of power engineering deals not only with electricity generation, electric power transmission and electricity distribution but also with electrical circuits and materials (e.g. insulators) that need to resist high voltages and currents. Another subfield is accurate measurement of electrical properties. Measuring an electrical circuit inevitably changes the voltages and currents in it. The objective is to minimize the influence of the measuring circuit or even compensate for it. The field also includes sensors that use a material’s electrical properties or electromechanical means of measurement. Examples of the former are piezoelectricity for measuring pressure and temperature-dependent resistors for measuring temperature. These sensors can be used in control engineering. Other major subfields of electrical engineering are telecommunication and electromagnetism. Transmitting information from one place to another requires a transport channel such as a coax cable, optical fiber or free space. These channels can be accurately described using the laws of electromagnetism, particularly Maxwell’s equations. Some other examples of how electromagnetism is put to every day use are antenna design for use in mobile phones, and controlling the form of the electromagnetic field in an MRI scanner by the exact placement and alignment of its electromagnets. Another technology made possible by electromagnetism is the microwave oven. The field of high-power radio-frequency (RF) engineering was once feared to be a lost art. Because of the trend for low-power, miniaturized circuitry, there is a perception that the need for high-power radio engineering and engineers is diminishing. On the contrary, the need for engineers and technicians in this particular field has never been greater, and the need will only increase in the foreseeable future. The tools and theories an electrical engineer can consult include mathematics and physics in general, the theory of electromagnetism, the theory of quantum mechanics, the mathematics of digital signal processing, control theory, the teachings of computer science. Electronics that deal with both electrons (electricity) and photons (light) are also called optoelectronics. The related field of fibre optics has led to the development of fast telecommunication systems and the expansion of the Internet [7].

Key Words

Practitioner — исполнитель

Subfield — подраздел

Components — компоненты

Resistor — резистор

Capacitor — конденсатор

Inductor — проводник

Transistor — транзистор

Diode — диод

Semiconductor — полупроводник

Simulation — моделирование, имитация

Electric power — электроэнергия

Transmission — передача

Distribution — распределение

Circuit — цепь

Insulator — диэлектрик

To resist — сопротивляться

Voltage — напряжение

Current — ток (электрический)

Accurate — точный

Measurement — измерение

Inevitably — неизбежно

Objective — цель

Influence — влияние

To compensate — компенсировать

Former — последний

Pressure — давление

To require — требовать

To transmit — передавать

Coaxial cable — коаксиальный кабель

Equation — уравнение

Optical fibre — оптоволокно

Placement — ориентировка

Alignment — выравнивание

Microwave oven — микроволновая печь

Frequency — частота

Circuitry — схема

High-power — мощный

was feared to be a lost art — боялись,

Trend — тенденция что был утерянным искусством

Perception — понимание To diminish — опасаться Foreseeable — прогнозируемый To include — включать Digital — цифровой

To lead to — привести к

Exercise 1. Answer the questions

1. What is electrical engineering?

2. Who are electrical engineers?

3. What does electrical engineering deal with?

4. Is accurate measurement of electrical properties another subfield of power engineering?

5. Does measuring an electric circuit change the voltages and currents in it?

6. What are other major fields of electrical engineering?

7. What does transmitting information from one place to another require?

8. Is antenna design for mobile phones an other example of electromagnetism?

9. Which tools and theories can an electric engineer use?

Exercise 2. Find Russian equivalents that deals with, practitioner, construct, electrical components, resistor, capacitor, inductor, transistor, diode, semiconductor, simulation purposes, network, transmission, distribution, electrical circuits, insulator, voltage, current, accurate, measurement, inevitably, compensate, former, pressure, objective, influence, means, coax cable, optical fiber, free space, accurately, particularly, every day use, design, exact placement and alignment, microwave oven, high-power radio-frequency, a lost art, the trend for, low-power, miniaturized circuitry, perception, diminish, on the contrary, the foreseeable future, tools, development.

Exercise 3. Find English equivalents Иметь дело с, изучение, применение, исполнитель, компонент, резистор, проводник, конденсатор, диод, диэлектрик, полупроводник, моделирование, комбинировать, сеть, электрическая цепь, распределение электроэнергии, высокое напряжение, ток, точное измерение, неизбежно, цель, минимизировать, влияние, компенсировать, последний, передача информации, давление, требовать, оптоволокно, коаксиальный кабель, точное размещение, выравнивание, магниты, микроволновая печь, мощный, миниатюрные схемы, восприятие, напротив, техники, распространение, цифровой, передача сигнала, привести к. Exercise 4. Say whether it is true or false

1. Electrical engineering is an engineering discipline that deals with the study and application of chemistry.

2. Electric engineering practitioners are called mechanical engineers.

3. Electrical engineers construct models of electrical components for simulation purposes.

4. They combine these components into larger electrical networks.

5. Measuring an electrical circuit doesn’t change the voltages and currents in it.

6. The objective is to maximize the influence of the measuring circuit or even compensate for it.

7. Other major subfields of electrical engineering are civil engineering and mechanical engineering

. 8. Transmitting information from one place to another requires a vehicle and wind

. 9. Some other examples of how electromagnetism is put to every day use are clothes design.

10. There is a perception that the need for high-power radio engineering and engineers is diminishing. 11. The need for engineers and technicians in electrical engineering has never been greater, and the need will only increase in the foreseeable future.

Exercise 5. Fill in the gaps with the words from the box

1. In the subfield of electronics, electrical engineers construct models of electrical components for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ purposes. 2. They \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ these components into larger electrical networks. 3. The subfield of power engineering deals not only with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, electric power transmission and electricity distribution but also with electrical circuits and materials (e.g. insulators) that need to resist high voltages and currents. 4. The field also includes sensors that use a material's electrical properties or electromechanical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

5. Other major subfields of electrical engineering are telecommunication and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

6. These \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ can be accurately described using the laws of electromagnetism. 7. Another technology made possible by electromagnetism is the \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

8. The field of high-power radio-frequency engineering was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ feared to be a lost art. means of measurement electricity generation simulation electromagnetism channels combine once microwave oven

Exercise 6. Fill in the gaps with prepositions

1. Electrical engineering is an engineering discipline that deals … the study and application of electricity and electromagnetism.

2. They combine these components … larger electrical networks.

3. These sensors can be used … control engineering.

4. Another technology made possible … electromagnetism is the microwave oven.

5. The objective is to minimize the influence of the measuring circuit or even compensate … it.

6. On the contrary, the need … engineers and technicians … this particular field has never been greater, and the need will only increase … the foreseeable future.

7. The related field … fibre optics has led .. the development of fast telecommunication systems and the expansion … the Internet

. Exercise 7. Complete the sentences with the information from the text

1. Electrical engineering is an engineering discipline that deals with …

2. In the subfield of electronics, electrical engineers construct models of electrical components for …

3. The subfield of power engineering deals not only with …

4. Measuring an electrical circuit inevitably changes …

5. The objective is to minimize the influence of …

6. Other major subfields of electrical engineering are …

7. Transmitting information from one place to another requires …

8. The field of high-power radio-frequency (RF) engineering was …

9. Electronics that deal with both …

10. The related field of fibre optics has led to the development …

Exercise 8. Complete the definitions below with the words from the box

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a device having resistance to the passage of an electric current

. 2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a device used to store an electric charge, consisting of one or more pairs of conductors separated by an insulator.

31 3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a solid substance that has a conductivity between that of an insulator and that of most metals, either due to the addition of an impurity or because of temperature effects.

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ an electromotive force or potential difference expressed in volts.

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ providing a faithful representation of someone or something.

6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ arrangement in a straight line or in correct relative positions.

7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ give a detailed account in words of

. 8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ not approximated in any way precise. Semiconductor Accurate Capacitor Alignment To describe Resistor Exact Voltage